WHAT IS CLAIMED IS:

1. A slip assembly for handling tubular members in a well drilling or workover procedure in oilfield operations, comprising :

a slip bowl having an upper end and a lower end and a tapered axial bore therethrough for passage of tubular member; and

a plurality of slip segments for insertion into the slip bowl, each slip segment comprising: (i) an upper end and a lower end; (ii) a tapered outer surface which complements the taper of the axial bore of the slip bowl and engages the axial bore of the slip bowl such that the lower end of each slip segment does not extend below the bore of the slip bowl; (iii) an inner surface which defines the shape of the axial bore for passage of the tubular member; (iv) a circumferential groove formed in the inner bore between the upper end and lower end; (v) a load ring installed in said groove; and (vi) a plurality of axial rows of dies with gripping surfaces protruding radially inward installed in each slip segment, some of the dies in each axial row being installed below the load ring and the remainder of the dies in each axial row being installed above the load ring.

2. The slip assembly of Claim 1, wherein the slip segments and load ring are fabricated from forged steel.

3. The slip assembly of Claim 1, further comprising a plurality of axial grooves formed in each slip segment which define the axial rows in which the dies are arranged.

4. The slip assembly of Claim 3, wherein each axial groove is a dovetail-shaped groove having a rounded bottom end and the dies contained within each groove have a wedge-shaped profile complementing the dovetail-shaped groove.

5. The slip assembly of Claim 4, wherein the lowermost die in each axial groove has a rounded bottom end complementing the rounded bottom end of the axial groove.

6. The slip assembly of Claim 3, further comprising:

a circumferential bore formed at the top of each slip segment, said circumferential bore perpendicularly intersecting the upper end of the axial grooves formed on each slip segment; and

a retainer ring inserted in the circumferential bore, said retainer ring inserted above the uppermost dies in each axial row such that the uppermost dies are in edge-to-edge contact with the retainer ring.

7. The slip assembly of Claim 6, further comprising:

means for urging the dies located below the retainer ring downward away from the retainer ring and toward the load ring; and

means for urging the dies located below the load ring downward away from the load ring and toward the rounded bottom end of each axial groove.

8. The slip assembly of Claim 1, wherein the circumferential groove has an undercut lower side.

9. The slip assembly of Claim 8, wherein the load ring has a tapered lower surface shaped complimentary to the undercut side of the circumferential groove.

10. The slip assembly of Claim 9, wherein the lower surface of the load ring is tapered at an angle of about 10 degrees with respect to the upper surface of the load ring.

11. The slip assembly of Claim 1, further comprising a means for connecting together the slip segments.

12. A slip assembly for preventing axial displacement of a drill pipe or other tubular member above or within a wellbore, comprising :

a slip bowl having an upper end and a lower end and a tapered axial bore therethrough for passage of tubular member;

a plurality of slip segments for insertion into the slip bowl, each slip segment comprising: (i) an upper end and a lower end; (ii) a tapered outer surface which complements the taper of the axial bore of the slip bowl and engages the axial bore of the slip bowl such that the lower end of each slip segment does not extend below the bore of the slip bowl; (iii) an inner surface which defines the shape of the axial bore for passage of the tubular member; (iv) a circumferential groove formed in the inner bore between the upper end and lower end, said circumferential groove having an undercut lower side; (v) a plurality of dovetail-shaped axial grooves formed in each slip segment, said axial grooves having a rounded bottom end; and (vi) a circumferential bore formed at the top of each slip segment, said circumferential bore perpendicularly intersecting the upper end of the axial grooves on each slip segment;

a load ring installed in the circumferential groove and having a tapered lower surface complementary to the undercut lower side of the circumferential groove, the lower surface of the load ring being tapered at an angle of about 10 degrees with respect to the upper surface of the load ring ;

a plurality of axial rows of wedge-shaped dies with gripping surfaces protruding radially inward installed within each axial groove of each slip segment, some of the dies in each axial row being installed below the load ring and the remainder of the dies in each axial row being installed above the load ring;

a retainer ring inserted in the circumferential bore, said retainer ring inserted above the uppermost row of dies such that the uppermost row of dies are in edge-to-edge contact with the retainer ring.

means for urging the dies located below the retainer ring downward toward the load ring, and means for urging the dies located below the load ring downward toward the bottom end of the axial groove; and

hinges for connecting the slip segments together to form a slip segment assembly.

13. The slip assembly of Claim 12, wherein the slip segments, load ring, and retainer ring are fabricated from forged steel.